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CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

Industrial Research and National Security

Robert P. Russell

President, Standard Oil Development Company

Medal Acceptance Address

THE recognition you have conferred on me is accepted with deep gratitude. In accepting it, though, I do so not as an individual but as a representative of the many American scientists and technicians whose achievements in the laboratories and plants were so vital to our victory. As a member of this group, I feel deeply honored. The incentive which springs from recognition of this kind is particularly gratifying today when problems of peace, no less essential to our national strength than those of war, demand our earnest consideration.

President Truman has given us a directive in his Army day address which I should like to take as the keynote of my remarks. "Far and above all," he said, "we must remain strong, because only so long as we remain strong can we insure peace in the world ... We must remain strong in order to retain leadership, and with all our resources exercise that leadership on behalf of a world of peace and harmony among all nations and all peoples."

We learned from the war that our strength as a nation is measured by the effectiveness with which our science and industry can be mobilized for national defense. Our victory was in large measure the result of a successful race against time in creating new weapons and getting them into active military use. In this race, fortunately, we were out in front. But today we know that our margin of advantage was often dangerously close. It was measured more frequently in weeks than in months, and sometimes only in days.

In order to help build a world of peace, we must guard against deterioration of the high standards of technical achievement set during the war. To be secure as a nation, we must be able, quickly, to place in the hands of our military forces all they require in the way of superior equipment. This achievement can come only from an integrated national effort in which the essential ingredients are (1) an adequate stockpile of basic scientific knowledge, which must come mainly from the universities; (2) applied science and development, contributed principally by the research

agencies of industry; (3) sound engineering, again stemming from the industrial research and development groups; (4) adequate industrial capacity; (5) able production management; and (6) such liaison between all these groups on the one hand and the military services and government on the other that our total effort can be marshalled promptly and wherever needed. This kind of planning in peacetime will help prevent another world war.

Above all, we must maintain an atmosphere in which problems of national defense can be as readily solved in peacetime as they were under the stress of war. Time is so vital in today's world that we dare not leave any problem involving our national existence to be solved under the pressure of an international emergency.

The contributions to our technical preparedness come from many quarters. It would be impossible to consider all of them, so I wish to confine these remarks to the contribution of our coordinated industrial research and development laboratories. I am convinced that our position of leadership in the world could not be maintained without their help. As a member of such a research and development group, I want to tell you how we operate, point out some of our problems, and consider with you certain tendencies which could seriously hamper peacetime work on problems vital to America's welfare.

A generation of experience has resulted in the "teamwork" principle being followed almost universally by research and development organizations. The complex problems of modern industry are best solved by seasoned teams of professional men—chemists, physicists, mathematicians, and engineers, with their corps of assistants, operators, mechanics, helpers, and clerks. Each major problem involving applied science requires not only the full-time effort of such a team but also the advice of numerous other staff members. The more minds that can be brought to bear upon a problem and the more ideas that can be generated, the greater the progress.

Teamwork Imperative

I know of no major new development that was solely, or even principally, the product of one man's genius. In every case of which I have personal knowledge, scores of workers contributed importantly to the final result. Admittedly the basic idea for an operation may have stemmed from the "flash and genius" of a single person, but the skeleton would still be dangling in the laboratory closet unless it had been equipped with blood and sinews, a nervous system and arteries. These came from many subsidiary, separate developments, each of which was necessary to make the whole body live and breathe.

The final development of a research project may, therefore, include the contributions not only of the team specifically involved, but also of second and third teams, and of supervisory persons who may have spent but little time on it. It is not infrequent that suggestions vital to the success of a project come from men not concerned at all with the problem in question, and whose only contact with it was through discussions at laboratory staff meetings.

Thus it will be seen that important developments cannot be lifted like commodities from a shelf. Each is the result of exhaustive research, long experimentation, many failures, and the application of the entire facilities of a large organization. The inventions and ideas which contribute to the success of a project are drawn from multiple sources, many of them coming from persons working in altogether unrelated fields.

During the war the vast complex of American research and development organizations was mobilized for national defense. It is now a matter of history that the remarkable achievements of American science and the tremendous production of American industry were vital factors of victory in World War II. That war was fought in the laboratory and the factory as well as on the battlefield, on the sea and in the air. American research and our system of production proved their strength. Not only did we turn out weapons and supplies in vast quantity, but our research and development teams displayed remarkable ingenuity in inventing new and improved arms.

Wartime Cooperation

Devices such as the flame thrower, radar, proximity fuse and atomic bomb were the results of cooperation between industry and government agencies. These and similar projects were undertaken by industrial organizations as a patriotic duty and as a contribution to our strength as a nation.

Today there is a tendency to forget the motives which underlie wartime cooperation. The supposition has become widespread that industrial laboratories are to some degree dependent on government financed work, or at least that federal contracts are a boon to them. This is an impression I would like to correct.

The peacetime programs of all important industrial research and development groups already include far more work than can possibly be accomplished in even a period of years. This is partly the result of the absorption of the laboratory staffs in war jobs during the last five years, and partly the consequence of the growing technical complexity in practically every line of industrial activity. The situation in my own company is, I believe, typical of that which confronts similar groups. Problems of

commercial importance to our company's operations, which must be solved if our business is to grow and prosper, will occupy the full capacity of our organization for many years.

Further, as a result of the war and the drafting of personnel from our laboratories and training centers, capable technicians are pitifully scarce. This is no temporary matter, as most of you know. An adequate supply of well trained technical men will not be available for years.

But even if technical men were available in sufficient numbers, we still could not provide them with adequate facilities because of the national construction emergency. It is impossible to predict how long it will take to provide sufficient facilities even for existing personnel, let alone make a reasonable guess as to when necessary expansion can be undertaken.

Then there is the matter of establishing a fair price for projects undertaken for government. A government agency contracting for a highly specialized device cannot pay, and is not expected to pay, for more than a small share of the backlog of tediously gained knowledge, the years of background research, the failures, the technical skill, and the costly equipment that qualify a laboratory to undertake such a development. These costs must be carried largely by other projects, and this can become an important factor in the planning of research and development programs.

Major research and development organizations, therefore, are not looking for additional work. They do not need revenue from government-financed projects. It goes without saying that, from a sense of national duty, the important research and development organizations will continue to make every effort to handle projects important to the nation's defense. But the services which these organizations can perform, and which are so important, can be obtained in full measure only if, in the laws governing these services, consideration is given to certain basic problems faced today by our industrial scientific groups.

Basic Problems

One of these basic problems concerns allocation of government contracts. The directors of a research and development organization would like to be certain that any government-financed work they are asked to undertake in the interest of national security could not be handled more effectively by some other group. My own company for example—and I am sure it is typical—will gladly accept work that it feels itself pre-eminently qualified to do. But it would be reluctant to undertake development which could be handled more efficiently by some other organization. Clearly, the public interest is best served by having the work done by the group most qualified to handle it.

Secondly, the industrial organizations engaging in government work should have all pertinent information concerning the problems they are asked to solve. Unless information is complete and is unreservedly available, unless the problem is revealed in its full scope, development work cannot be carried on with efficiency. A policy of compartmentalization results in decreased effectiveness of scientific and research effort. Those in charge of national defense projects should accept the fact that properly qualified members of our industrial laboratories are patriotic citizens entirely capable of safeguarding military information. This has been amply demonstrated by our war experience.

Finally, research and development organizations want to be sure that in undertaking to do government-financed work, they will be able to apply freely and without reserve the entire resources and ability of their organization. It is in this connection that the patent provisions contained in government contracts and certain pending legislation for the control of patent rights are of vital public concern.

Patent Rights

The result of an important development project, involving multiple ideas and inventions, is a process covered by patents. We have long been accustomed to look upon the patent right as the inventor's reward for disclosing his invention, and the vigor that has characterized our industrial development as a nation springs largely from our patent system. With minor exceptions it has served the country well.

During the war, the Office of Scientific Research and Development, the National Defense Research Committee, the Army, the Navy, and the Air Force usually provided in their contracts with industrial organizations that the government would receive a royalty-free license to use for purposes of national defense any inventions made in the course of work carried out at government expense. These contract provisions, as worked out and applied during the war, are in my opinion a good method for handling the relationships of government with private research groups. They completely safeguard the interests and rights of the government. They are, at the same time, fair to the research organization.

It should be realized that under *present* laws the government has the right to use any invention covered by patents and to make or have made for its use anything covered by patents. The owner of the patents in such cases has the right to reasonable royalties which, if necessary, can be determined by the courts. But no patent can block the government from obtaining what it needs for its own use.

Since the war, however, the idea

has grown that we should go far beyond these provisions; specifically that any inventions made in the course of work financed by the government should become government property and be licensed free to anyone. The root of this idea is the sound premise that no one should derive private profit from projects financed with public money.

No one questions that this premise is entirely reasonable. In actual operation, however, I am afraid the provisions intended to insure it would react against the public interest and would fatally handicap development work for the Armed Forces.

It is impossible to divide a man's mind. An industrial research organization cannot devote itself to a problem for government without bringing to bear on that problem all of its accumulation of background knowledge and facilities. This is particularly true if the problem is in the field of the organization's normal industrial activity. No one can say how much of the results of a given scientific study derive from the part financed by government and how much from the private organization's own prior and current work in the field. If an industrial research group must hand over all discoveries made in the course of a government project, and if, in addition, its past and present discoveries are to be dumped into the government pool, it becomes difficult if not impossible for the organization to engage in such work without endangering its competitive existence.

Further, the full potentialities of any discovery are usually realized only after years of work. This work entails many risks and, generally a number of failures, perhaps costly failures. If no individual or group can hope to gain from a discovery derived possibly in part from work in the public domain, who can be expected to carry development forward aggressively and efficiently? There is a saying that what is everybody's property is nobody's property, and nowhere does this apply with greater force than in the field of applied science.

The Kilgore-Magnuson Bill

As an example of legislation in the scientific field currently under discussion, let us consider the National Science Foundation Act of 1946, known as the Kilgore-Magnuson Bill. In its present form the bill provides that an industrial organization entering into a contract with a government agency shall make available to that agency full data on all inventions, discoveries, patents, patent rights and findings produced in the course of the development. These discoveries and inventions can then be retained by the government agency or released to the public on a nonexclusive, royalty-free basis. Or the government agency may provide for the retention by the contractor of

such patent rights as the government agency deems fair and equitable, and consistent with the national interest.

Under these conditions, I believe that many research and development groups would be practically prohibited from undertaking work for the government in fields of their own commercial interest—which, incidentally, are the fields of their outstanding competence. For one thing, it would be difficult, if not impossible, to separate patent rights paid for by the government from those stemming from the normal commercial activities of the company. I seriously fear that the ultimate effect of such legislation would be to stifle development for the Armed Forces rather than protect it.

Another provision of the bill, to follow this example further, stipulates that before entering into any undertaking or agreement, the head of a government agency shall make every reasonable effort to arrange for the conduct of the necessary research and development without entering into a contract which provides for the return to the contractor even of such patent rights as the government agency deems fair and equitable, and consistent with the national interest. This clause places the government agency in the position of having to allot contracts to whichever industrial organization is willing to grant the most extensive patent rights to the government, although quite possibly this may not be the organization which can do the best job. Under this provision a tendency to place the question of patent rights ahead of the competence of the contractor could easily develop.

These considerations are not a matter of concern to industry alone but have also received the attention of persons in positions of high responsibility in the government. In a letter to Senator Thomas dated April 5, 1946, Secretary Patterson emphasized that such provisions "would impose an impossible burden on the Secretary of War". Quoting further from the Secretary's letter, "Experience has shown that a contract requiring the vesting of full ownership of patent rights in the Government would further narrow the Government's choice of contractors . . . It is extremely important that the War Department should be free to contract with any qualified contractor in order to provide most effectively for the national security. Any restrictions on the availability to the War Department of contractors will seriously impair national security."

Secretary Patterson recommended that the subsections of the bill relating to patent rights "shall not apply to the War or Navy Departments or any established defense agency, provided that the War or Navy Departments or established defense agency shall obtain in any federally-financed research and develop-

ment contract at least an irrevocable. non-exclusive, royalty-free license for governmental purposes of the United States to the extent that the contractor is able to grant same". In a similar letter to Senator Thomas, Acting Secretary of the Navy W. J. Kenney also expressed opposition to the patent provisions as set forth in the bill.

Both departments recommended, in effect, peacetime continuation of the patent provisions which were employed during the war and under which most of the industrial organizations found themselves able to operate.

Workable Patent Provisions

Concerning this matter of patent provisions, Dr. Vannevar Bush, Chief of the Office of Scientific Research and Development, emphasized in a report to the President that, although public interest must be protected, at the same time a contracting organization must be left with adequate freedom and incentive to solve problems assigned to it. He suggested that the public interest would normally be satisfactorily protected if the government received a royalty-free license to use for government purposes any patents resulting from government-financed work. He specifically urged that there should *not* be any absolute requirement that all rights in such discoveries be assigned to the government, and he recommended that legislation should leave the administering agency with such discretion in its patent policy that arrangements could be adjusted to meet both government and company interests.

The American Chemical Society has stated that it does not believe there is any necessity to include in pending legislation any special patent clauses over and above those which now pertain to all government-financed research carried on today under existing statutes.

I am convinced that the principal United States industrial research and development organizations are badly needed now and will continue to be needed in the solution of problems essential to national defense. Therefore, it seems to me of vital importance to establish conditions under which these companies can cooperate most effectively. This is a matter that directly affects every American citizen. A step in the wrong direction at this time could seriously impede the industrial development upon which the military strength of our nation depends.

The McMahon Bill

Another bill directly affecting technical progress and of great current interest is the McMahon Bill for the Development and Control of Atomic Energy. This bill *authorizes* the Atomic Energy Commission to requisition or condemn any invention which utilizes fissionable material or atomic energy, or any patent or patent application covering any such invention or discovery. Further, it

requires the Commission to declare any patent to be affected with the public interest, and therefore subject to compulsory licensing, if the invention or discovery covered by the patent utilizes fissionable material or atomic energy, and the licensing of such invention or discovery is necessary to effectuate the policies and purposes of the Act. These policies and purposes are so broad that they bring within this provision practically any patent in the whole field of fissionable material and atomic energy, regardless of whether a military application is involved.

Development in this field is of such vital significance to our national defense that there must be government control of source materials, and the production of fissionable material should be under strict government license. At the level of adaptation, and use however, it seems to me that our patent system could be relied upon to safeguard the national interest and to advance the art just as it has promoted progress in so many other fields in the past.

It is my conviction that practically all United States industry is most anxious to see sound, widespread development and industrial use of atomic energy. Given incentives such as are provided in the United States patent system, I feel sure that vigorous competition in the atomic energy field would result in the creating of important inventions covering major peacetime industrial applications. Yet I have heard directors of the research and development departments of large United States industrial organizations express the opinion that proposed legislation on atomic energy would reduce industrial incentive so sharply that their organizations would be unable to follow an aggressive experimental policy in this field. I am sure that you will agree with me that any reduction of incentive in this important field of research and development would be nothing less than catastrophic.

The Incentive System

Dr. Langmuir, of the General Electric Company, in his testimony before the McMahon Committee, described the powerful and far-reaching incentives which Russia has provided in the field of atomic energy and other scientific provinces, incentives in the form of extraordinary government encouragement and truly impressive material rewards for achievement. The Russians, he said, "are adopting an incentive system even more effective than that which we have inherited from our capitalistic system. If we continue through the effects of government policies and labor legislation to overlook the incentive upon which our progress has depended, we may expect a period during which Russia forges ahead far more readily than we do". To me it seems clear beyond a doubt that if we should in any way reduce our own

industrial initiative by lessening our incentive in this vital field, we may be surpassed by other nations.

We need *not* be surpassed by anyone. During the war, government, science, and industry worked as a well-coordinated team, and I am certain that no member of the team has any intention today of weakening that cooperation. Therefore, I am convinced that a formula can and will be found which will safeguard the public interest and at the same time give our industrial research and development agencies the freedom and incentive to cultivate vigorously the new scientific fields in which American technical genius was largely intrumental in breaking soil. My optimism is rooted in my deep confidence in our people. Every time in the past that our nation has been called upon to meet a challenge, it has responded in a measure far beyond our anticipation. We have never been able to appreciate or even grasp the enormous sweep of the capacity of this great nation of ours. It never ceases to amaze us. The very fact that we can, in a national emergency, rise to heights of production and strength beyond even our own expectations seems to me a very good proof that our system is basically sound. We should therefore endeavor in every way to strengthen it and should move with extreme caution in attempting to change it.

Up to now, the basis of our vigorous industrial development has been the desire of one individual to progress beyond another, to win the reward for making a product better, or making it available easier or cheaper. To retain the character of this system we must not sacrifice the incentives that make it possible. Let us be sure that the ultimate result of any legislation now contemplated will be beneficial to the basic industrial development upon which both our well-being and national safety depend.

Shepard Wins Navy Citation

Norman A. Shepard, F.A.I.C., chemical director, American Cyanamid Company, New York, N. Y., was awarded a special citation from the U. S. Navy for meritorious civilian service.

Heiberger with Arrow Lacquer

Philip Heiberger, M.A.I.C., has joined the Arrow Lacquer Company, Brooklyn, N. Y., as chief chemist. He was formerly project leader with Ralph L. Evans Associates, where he specialized in resin technology.

Dr. Alexander Silverman, F.A.I.C., head of the chemistry department of the University of Pittsburgh, addressed the Western Maryland Section of the American Chemical Society in Cumberland, May 24th, on "Glass: Retrospect and Prospect."

Russell in the War Effort

Major General Alden H. Waitt

Chief of the Chemical Warfare Service

Courtesy *Chemical and Engineering News*

Maj. Gen. Waitt and Mrs. Robert P. Russell at Medal Dinner

I HAVE known Mr. Russell for many years and have served closely with him in connection with many projects, especially during the late war. I believe that I know better than anyone else his great contributions to the war effort during these past five years.

Your medalist is truly a veteran—a veteran of two wars. In the first World War he wore the uniform of the Marine Corps. I have no doubt that he was a good marine. The Marine Publicity Corps tell us there is no other kind. Besides, Mr. Russell wound up as a buck private, which is a fine testimonial in itself.

Mr. Russell was not in uniform in World War II, but served as a civilian. His contribution to winning the hard-fought victory was as great as that of most of us in uniform. He was highly instrumental in making it hot for our enemies, both from the air and on the ground.

My first association with him dates back twenty-two years, to M.I.T., where Mr. Russell was already advancing by degrees. We worked together there in the research laboratory of applied chemistry on the first large scale demonstration of the methanol synthesis and on other high pressure syntheses. Even at that time he had attained considerable distinction in his profession, and the joint Haslam-Russell "Bible" on fuels and combustion was a pioneer in its field.

Not long after Pearl Harbor Mr. Russell telephoned me from New York and said he wanted to talk to me about a new incendiary bomb on which he and his group were working. At that time I was in charge of the Miscellaneous Branch of the Operations Division of the War Department General Staff. This was the general staff branch that handled Air Corps matters in those days.

He came to see me and told me of his problem. He was always interested in something new. This time it

was a new and entirely different type of incendiary bomb. He was convinced that it had great merit and offered tremendous possibilities, but he felt that our technical staff were rather lukewarm about it. He explained that preliminary work had been done at Bayway by technicians of the Standard Oil Development Company working under the National Defense Research Committee: that tests had shown great promise: and he showed me some colored motion pictures of these demonstrations.

At that time our army had no incendiary bombs of its own. The Chemical Warfare Service had only recently been charged with the responsibility of developing and producing incendiaries for the Air Force. At long last we were being given a chance to prove what we had insisted for years—that fire bombs would pay greater dividends in destruction than explosive bombs. Mr. Russell asked my assistance in bringing his idea to the attention of General Porter, then Chief of the Chemical Warfare Service, and his senior officers most concerned with such developments. I arranged this and assisted in furthering his efforts.

Well, to make a long story short, the new bomb was finally put on the list of projects. There were many heartaches and headaches in perfecting this bomb, but eventually it was adopted—and used. Mr. Russell's first trip overseas to England in the summer of 1942 was made in connection with this project.

The success of the M69 Aerial Incendiary Bomb, and its final modification into the M74, is now a matter of history. It played a major part in the air attacks on Japanese cities; searing assaults which caused the Japs to start to unroll the white flag even before the first atomic bomb was dropped. Up to six weeks before VJ Day, more than half the tonnage of incendiaries dropped on Japan were M69 bombs.

M69 Most Effective Bomb

This type of bomb did not go into action until the closing days of the war. Even so, more than four and one-half million were dropped on Japanese targets carrying either of the two new incendiary agents—Napalm and Pyrogel—developed during the war, they released nearly six thousand tons of flaming oil mixture on enemy production centers.

In my opinion this was the most effective type of incendiary bomb used during the war. It was highly instrumental in the defeat of Japan. It is very doubtful if we would have had this bomb if it had not been for the man who is being honored tonight. He had much to do with its idea and basic development, but he had more to do with its acceptance and final adoption. His belief in it, his determination that it must be used, and his energy and perseverance as its chief protagonist more than any-

thing else brought about its final adoption. Not only was this particular bomb largely his brain child, but he was the man who sold it to the users.

Another important fire weapon in the Pacific, and one that also made it hot for our enemy in the European theater, was the flame thrower. This blazed the way on the ground approaches to Tokyo just as the fire bomb burned out the home production centers.

Improved M2 Flame Thrower

Here again Mr. Russell's assistance was invaluable. As Chief of the Petroleum Warfare Division of the National Defense Research Committee, he was concerned with all flame weapons. His research group gave much thought to making the portable flame thrower a practical weapon and contributed especially to better fuels, increased range and improved methods of use.

The old M1 Flame Gun had a range of twenty-five to thirty yards. The succeeding M2 model was the result of the fine collaboration between the Chemical Warfare Service and the National Defense Research Committee. The M2 had a range over twice that of its predecessor, gave better pin-pointing, and was very nearly sure fire. Men's lives were lost because the old M1 failed to ignite at a critical time. We have no record of serious failures of the M2.

Now Mr. Russell has always been a first rate seller of ideas as well as scientist. Even war did not deter him from taking his wares to prospective users. In February, March and April of 1944, he carried the new flame throwers on a trip to the Southwest Pacific. When he reached New Caledonia, army intelligence reported that a major Japanese offensive was scheduled to begin at Bougainville. Since his mission was to study and advise on the use of chemical warfare weapons, Mr. Russell immediately hopped to the potential scene of action.

He found that, for one reason or another, neither of the divisions there was making the most effective use of the new flame thrower or the new fuel. He had to convince both the senior officers and the soldiers that the less spectacular thickened gasoline was much more effective than the unthickened fuel which gives a tremendous and spectacular blast of flame. He instructed, insisted, persuaded and finally demonstrated the value of the proper use of the flame thrower and of the thickened fuel. A true showman, he finally decided that the only way to convince entirely all parties was to have a full scale comparison of the two types of fuel carried out in the presence of the operations chiefs of the 37th and the Americal Divisions. The tests were convincing and he made his point. But then he wanted to make sure

that every man on the island who was charged with firing the flame thrower knew and understood the weapon, and so he talked personally with every one of them and even went out with them into forward areas to see that the job was done properly.

This intensive effort of living and working with the troops led to the proper use of the improved flame gun in that area and it gave him first hand knowledge of requirements which he brought back with him and transmitted to those who were trying to improve the flame thrower. His work in this respect was generally recognized by the commanding officers in the theater. I followed him over the same ground a few months later and I know how greatly his efforts were appreciated over there.

Though a civilian, Mr. Russell did not escape being a casualty. He left Bougainville for Guadalcanal on a PBY which crashed in landing. He was painfully injured. This mishap is held responsible for the impairment of vision in his right eye. Like a good soldier, however, he completed his mission before returning to the states.

All the things connected with the man we honor were not devoted to death and destruction. As Chief of the Chemical Warfare Service, I am especially mindful of the Esso Mechanical Smoke Generator. He had a large share in its development. Here that same imagination, foresight, drive, and force, had an important share in giving us another battle device, only this time it was something to save life rather than destroy.

Smoke Generator Developed

Again it was something that had to be started from scratch. We had no smoke generators when we entered the war. The British were using smudge pots, but the latter had many disadvantages. We wanted a fog machine of our own, one that would make plenty of smoke cover. Through the same kind of cooperation, we got the big Mobile Esso Generator, which can, within ten minutes, blanket a square mile of area. It is a tribute to American ingenuity that less than six months from the time the idea was given by Dr. Langmuir, these machines had been developed at Bayway, put into mass production and were with our troops when they landed in North Africa.

Screens established by this and other apparatus covered river crossings from the Volturno to the Rhine, and hid ports and other bases from enemy airmen. By saving lives and equipment, this modern armor did much to shorten the war.

I also want to point out some of the new and improved petroleum products or processes developed under Mr. Russell's direction.

He helped materially in making possible the 100-octane gasoline that was so necessary to our airmen. The

fluid catalytic cracking process not only produced fifty per cent of this aviation fuel, but also provided the butylenes required for the bulk of the petroleum butadiene program. Butyl rubber, exclusively an American achievement, is derived almost entirely from one of the refinery gases that go into the manufacture of aviation gasoline. Incidentally the processes used in making more than eighty per cent of all the synthetic rubber produced in this country were developed under Mr. Russell's management.

Toluene Process Evolved

Over half of the nation's toluene for the manufacture of TNT was produced by processes evolved under his direction. There is a thrilling story of how in the early days of the war the first great shipment of toluene was made in record time. The Ordnance was desperate for a supply of the basic material. Working under highest pressure, toluene was synthesized at Bayway and in order to get it to the south, rails were cleared, passenger traffic was held up, and a full train shipment was sent down south in strictest secrecy and faster than first-class passengers could get there—more Russell energy.

Also originating under his supervision were rust preventives, special oils for aircraft hydraulic controls, special lubricants for military vehicles, and effective insulation for vital electrical military equipment.

Despite all this, Mr. Russell found time to render important service to the United States Strategic Bombing Survey. Last year, as director of the Oil Chemical, and Rubber Division of the survey, he took an active part in the field work in Germany which was made at the heels of, or along with, the task forces. On one occasion he examined the highly important synthetic oil plant at Leuna less than a week after the battle and while conditions were extremely hazardous. Colonel D'Olier, chairman of the survey, has told me of the great value of Mr. Russell's service to USSBS. One of the most important things he brought to the work was his insistence on the high quality of scientific and technical work that must be done by the various industrial divisions. He, perhaps more than anyone else, showed the value of research to the survey. Colonel D'Olier feels that if it were Mr. Russell's work with the National Defense Research Committee and the Chemical Warfare Service which had broken down his health, it was the USSBS which restored him to health.

He says that early in 1945, Mr. Russell had to return to the United States from Germany on the advice of the doctors. He was told to take a six months' rest—he took about six weeks. Then he went back into harness again and soon returned to Europe with instructions to be very careful of his health.

This time his son, who had completed his battle tour with the Air Forces, joined him. Somehow or other they got hold of a jeep and in ten days the two of them covered two thousand miles of rugged and torn-up country investigating the effects of incendiary bombs and the condition of oil, chemical and rubber plants. Mr. Russell returned from this little jaunt looking better than he had for months and, according to Colonel D'Olier, the improvement in his physical condition dates from that time. I covered a good many miles myself in a jeep and I cannot say that I recommend it as a rest cure.

His division uncovered evidence of contributions by Nazi technicians to the Japanese fuel industry. As a result, he played an important role in high-level conferences which preceded the aerial offensive against Japan. His keen analysis of the German chemical industry was not only important to the survey, but was of inestimable value to occupation control authorities. It is really remarkable how he does so much and how he gets things done. He is a very practical scientist. It is told by a G.I. that on one occasion when Mr. Russell wanted some photostatic work done in a hurry, he substituted a bottle of scotch as a catalyst with splendid results.

His work with the survey brought Mr. Russell a special letter of commendation from the Secretary of War. Also the Medal of Freedom for outstanding services with military operations in a war theater. In all, he made four trips overseas—three of them right at the front, in active operation. Less than two weeks ago, under orders from the President of the United States, Mr. Russell received from my hands the country's highest civilian award, the Order for Merit, together with a citation for his efforts during the war.

There is a great satisfaction in watching a friend grow in professional and business stature and receive the recognition due his abilities. I have watched your medalist grow throughout the years and, as a friend, am proud of all that he has accomplished.

After serving nearly five years with him under the stress of war, I feel I can say truly that he contributed as much to winning the war as anyone with whom I have been closely associated.

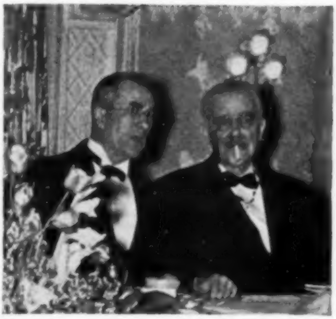
THE AMERICAN INSTITUTE OF CHEMISTS has chosen wisely in making this award. I am sure that it is richly deserved. Robert Russell is a shining example of the truism that the will to serve is as powerful as the sword.

Dr. Gustav Egloff spoke before the Chicago Section of the American Chemical Society, April 30th, on "Some Experiences in China."

Russell as I Know Him

Dr. Warren K. Lewis

Massachusetts Institute of Technology



Courtesy *Chemical and Engineering News*

Dr. Lewis and Dr. Wallace P. Cohoe

ONE day in June, 1919, Robert Price Russell, then recently discharged from the Marine Corps, came to the Institute to register as a student in chemical engineering. He had graduated from Clark University in Worcester two years before and now-a-days would have entered as a graduate student. However, in those times the Institute's policy was rough. Credit was given for work done elsewhere only in case it was substantially identical in content and type of instruction with that at the Institute itself. Under this system, for example, despite his year and a half in the marines, Russell was told to repeat freshman drill because "he had not had the theoretical phases of the subject." He had majored in organic chemistry at Clark and had done advanced work under Dr. Hale in Michigan, but because he stubbed his toe on a few questions in first term organic chemistry, he had to repeat the chemistry of the aliphatics, although excused from that on aromatic compounds. He was put into a program requiring three years to get our bachelor's degree.

However, mere time-consuming, irrational set-backs of this sort could not stop this undiscourageable boy, and he plowed ahead with the schedule. In time we at the Institute began to appreciate something of his quality so that after two years and ten months he was finally allowed to transfer to graduate status, completing the program for the master's degree in the School of Chemical Engineering Practice in the fall of 1922.

Late in 1922 Russell was taken on the staff of the Institute's Research Laboratory of Applied Chemistry by R. E. Wilson, its director at that time. Shortly thereafter he was assigned to work on corrosion under W. G. Whitman, a field to which he devoted a large fraction of his effort for the next five years. It was in

connection with this work that we at the Institute first began properly to evaluate Russell's capabilities. He had enthusiasm, energy, and an undiscourageable capacity for hard work. He had analytical capacity and sound judgment based upon it. He exhibited initiative both in ideas and action.

However, the characteristic which set him apart was his effectiveness in cooperation as a member of the team. It is true that he started out under Whitman, but in a relatively short time, he himself had direct charge of the corrosion group. During the period of his connection with the program his name appeared on a dozen papers on the most varied and important phases of corrosion work. Of these papers, only one was by Russell alone. In all other cases, the work was a cooperative effort with from one to three other men. Russell was at his best a member of the team.

Russell was far too valuable a man to be restricted to a single phase of the work of the Laboratory. One of the problems to which he turned was an analysis of the operational procedures of small commercial laundries, where, among other things, he introduced methods of corrosion control based on his experience with the larger program. R. T. Haslam who, after Wilson went with Standard Oil Company of Indiana, had taken over direction of the Laboratory, was initiating at the Institute an extensive program on fuels and fuel utilization. At an early stage Russell was brought into the work and his contributions were so constructive that Haslam took him in as co-author of *Fuels and their Combustion,* published in 1926, a text, which, while they have been unable to revise it since that date, is still an authority in the field. Russell's contributions to the Laboratory as a whole were so outstanding that, despite his youth, in 1925 after less than three years on the staff, he was promoted to assistant directorship of the Laboratory with the faculty rank of assistant professor.

Policy As Research Director

In 1927 Russell was offered and accepted the position of director of a new research laboratory established by Jersey Standard at Baton Rouge, Louisiana. Here, he initiated a broad program of research in the field of petroleum refining, not aimed primarily toward the solution of the immediate, trouble-shooting problems with which the refiner is faced, but looking ahead to the developments achieveable in the industry in the next decade. He staffed the laboratory with young, able men, well-trained and of the broadest possible background. In doing this, he had to accept inexperience. The achievements of the laboratory during the subsequent nineteen years attest the soundness of his policy.

A few years later he was called to the vice-presidency (now the presi-

dency) of the Standard Oil Development Company, of which the Louisiana laboratory is a single research group. This involved broadened responsibility, but his general field remained the same—the direction of the research and development program of Jersey Standard.

Accomplishments

An organization, like an individual, is judged by the results it achieves. It would take us too far afield to present a comprehensive survey of the accomplishments of Russell's organization, but attention will be called to three achievements of outstanding importance. The first was the development of the techniques of polymerization of isobutylene and the utilization of the products. Polyisobutylene of high molecular weight, known under the trade name of Vistanex, is important as a material for electric insulation. Polyisobutylenes of lower molecular weight are used for the control of the viscosity of lubricating oils. The final development in this series was the synthesis, by copolymerization of isobutylenes with suitable dienes, of butyl rubber, outstanding synthetic for the manufacture of inner tubes.

The second achievement was the development of methods of manufacture and purification of butadiene from petroleum raw materials. One must keep in mind the fact that neither the Germans nor the Russians had started with petroleum as a source for butadiene for synthetic rubber. Russell's organization had a high temperature cracking process which was modified for temporary use in butadiene production in meeting the rubber program, but, what was far more important, it developed an outstanding process for catalytic dehydrogenation of butylene to the diene and another process for the isolation and purification of the latter. Over ninety per cent of the butadiene produced from petroleum in this country for use in the rubber program employed in its manufacture one or more of these processes developed by Russell's men.

The third achievement, perhaps of even greater importance than either of the other two, was the development of the so-called fluid catalyst process for the cracking of oil. The process was brought to demonstrated practicability at the very outbreak of the war. It was used in connection with the manufacture of more than half the aviation gasoline produced in this country during the war. Of achievements such as these any organization is proud.

Personal Qualities for Success

The fundamental reason for the success of Russell's career is that he is in the finest sense of the phrase an all-round man. Nevertheless, more careful study leads one to feel that there are three characteristics truly outstanding in the contribution to his achievement. The first is Russell's

insatiable capacity for hard work. He works himself and he expects, encourages, and inspires, equal effort and energy of every one associated with him. The second is courage. He is willing to stick his neck out. The opportunity to achieve which his organization has enjoyed has in large degree been bought by Russell's willingness to take the responsibility and assume on his own shoulders the risk for the programs undertaken. Finally, there is Russell's capacity for cooperation, his habit of working as a member of the team. He never loses sight of the fact that, given effective cooperation based on mutual confidence and loyalty, the achievement of the team can far transcend the sum total of the utmost potential accomplishments of the members functioning as individuals. There are men who possess many of his fine qualities, but few indeed who match him in these.

America stands today in one of the great crises of her history, threatened with economic and social chaos as a result of the struggle between management and labor. The trouble is the fact that the nation's labor policy is based on a false major premise, the mistaken assumption that the fundamental, underlying, ultimate interests of labor and management are divergent. This has quite logically led us into destructive economic war. If the groups could only recognize that their interests are convergent—not identical but convergent—even the blind would see that the situation calls for a whole-hearted cooperation among all involved. A contributing cause of our difficulties is the widespread feeling that we can get what we want by taking it away from other people and that in consequence there is no real necessity for work. America needs men who are willing to work indefatigably in the interest of the common good, who believe in cooperation and how to practice it and who have the courage to tell their fellow citizens their convictions of the truth.

America needs more Robert Price Russells.

I.F.T. Elects New Officers

The Institute of Food Technologists announces the election of the following new officers: president, E. H. Harvey, director of research, Sun Chemical Co., New York, N. Y.; vice president, H. C. Diehl, director of Refrigeration Research Foundation, Berkeley, California; secretary-treasurer, G. J. Hucker, New York Agricultural Experiment Station, Geneva, New York.

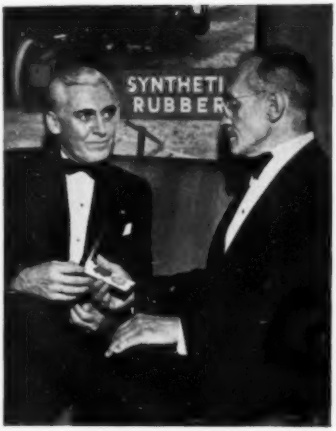
H. A. Heiligman, F.A.I.C., E. J. Lavino and Company, Norristown, Pennsylvania, has been elected the first chairman of the newly organized Philadelphia Chapter of the American Ceramic Society.

Robert Price Russell

Dr. Gustav Egloff,

President, the American Institute of Chemists

Universal Oil Products Company



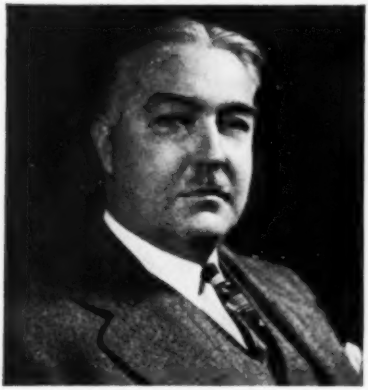
Courtesy Standard Oil (N. J.)

Mr. Russell and Dr. Egloff

OUR medalist, Robert Price Russell, personifies the American ideal. His life is, indeed, that story of success which is the dream of every boy in our nation. He has coupled his inherent ability with hard work, his knowledge of science with ingenuity to initiate and direct some of the most outstanding developments of our time. These achievements attest his talent as a chemist, a chemical engineer, and an administrator.

In time of war, Mr. Russell has unselfishly devoted all his efforts to those tasks at which he was most competent. In World War I, he was a member of that intrepid, fearless branch of the armed forces, the Marines. In World War II as a civilian, he rendered even greater service to his country. Under his direction, improved processes were developed for making the 100-octane gasoline, the toluene, the Buna-S and Butyl synthetic rubbers, without which our military machine would have bogged down. Extraordinary weapons such as smoke generators, aerial incendiaries, and flame throwers were also invented under his leadership.

These accomplishments at the Standard Oil Development Company, however, are only a part of his contributions during the war years. He gave invaluable service as a consultant to the Office of Scientific Research and Development. His responsibilities also called for that brand of courage displayed by men on the fighting front. While on a mission to the Pacific with the battles still raging, his plane crashed on Guadalcanal. He suffered severe injuries



Greystone-Stoller Corp.

President Foster D. Snell

Vice-president Joseph Mattiello

New officers to serve for a term of two years were elected at the Annual Meeting of THE AMERICAN INSTITUTE OF CHEMISTS held May 17, 1946, as follows: President, Dr. Foster D. Snell, president of Foster D. Snell, Inc., Brooklyn, New York; Vice president, Dr. Joseph Mattiello, technical director, Hilo Varnish Corporation, Brooklyn; Secretary (re-elected) Dr. Lloyd Van Doren, chemical patents, New York, N. Y., and treasurer (re-elected) Dr. Frederick A. Hessel, president, Montclair Research Corporation, Montclair, New Jersey.

Councilors elected for a three year term were Dr. Donald B. Keyes, vice president, Heyden Chemical Corporation, New York, N. Y.; Dr. Raymond E. Kirk, dean of the graduate school and head of the department of chemistry, Polytechnic Institute of Brooklyn, N. Y., and Dr. Donald Price, technical director, Oakite Products, Inc., New York, New York.

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but recovered to serve in Europe before VE Day as chief of the Oil, Rubber and Chemicals Division of the United States Strategic Bombing Survey.

For the years ahead, America is fortunate in having such a brilliant leader as Bob Russell. Great as his achievements have been, they are but an augur of the many more to come, It is timely that we, as chemists, should award him the highest honor which we can bestow. Robert Price Russell, I am privileged to present to you THE AMERICAN INSTITUTE OF CHEMISTS' Gold Medal Award for the year 1946.

Our Annual Meeting

The twenty-third Annual Meeting of THE AMERICAN INSTITUTE OF CHEMISTS was held at the Hotel Biltmore, New York, N. Y. on May 17th, with an attendance of over three-hundred professionally-conscious chemists.

On exhibition in the meeting rooms were products resulting from research by chemists of the Standard Oil Development Company; including butyl rubber, Vistanex compounds, alcohols, oils, fog material, incendiary bombs, flame throwers—some equipment so new that it was only recently completed, and though superior to military equipment in use was not available before the war's end.

The afternoon symposium featured "The Professional Status of the Chemist". Following a talk on the accomplishments of the INSTITUTE by President Gustav Egloff, the symposium began with speakers, Dr. Raymond E. Kirk, Dr. Foster D, Snell, Mr. John M. Weiss, and Mr. John D. Coleman. (These papers will appear in the next issue of THE CHEMIST.) The brisk discussion which followed threatened to run the symposium period far beyond its alloted schedule.

Dr. E. L. Luaces stated that registration of chemists should be carried out by the individual states, for the police powers of a state are a part

Courtesy Standard Oil (N. J.)

Corner of New Products Exhibit

of state's rights. Chemists in Ohio are largely in favor of licensing, as shown by 83 per cent of American Chemical Society members voting by secret ballot in a poll conducted by *Isotopics.*

Dr. Egloff called attention to the experience of engineers in Illinois with regard to a definition of "engineer", which appeared in the registration act for engineers of that state. He estimated the American Chemical Society membership at 43,000 and the total number of chemists in the United States as possibly 100,000. What provision can be made to obtain a national referendum of the wishes of those chemists who are not members of technical societies to determine their attitude toward registration? Can a definition of "chemist" be worked out which will cover all the different things that chemists do? He also stated that he was in

agreement with Dr. Kirk, that a university course cannot include all the "dodads" that concern the workings of any one industry, for a particular field moves too rapidly. Speaking for the oil industry, he said that by the time a professor gave a course on it, the course would be too far behind later developments. He recommended fundamental courses. He asked that professors "put more steel into the backbone of their graduates," so that the chemist speaks with authority and without timidity. He recommended that public speaking and foreign languages, particularly German and Russian, be taken throughout the college course.

Dr. Kirk said that young men were interested in knowing whether the engineers' registration act has done anything to improve the economic status of the engineer.

Mr. Weiss replied that as result of the registration of engineers, in certain states only licensed engineers may hold engineering positions under civil service, and that the compensation for these engineering positions has been substantially raised. A comparison of the civil service engineering positions with those for chemists in these states will show that the engineers' situation has been materially improved over that of the chemists'.

Mr. Coleman gave instances of the advantages of registration to engineers in Ohio. Recently the state indicated that it was going to advertise for bids for an engineering project. The Society of Professional Engineers promptly recommended that engineers be selected on the basis of their ability and not on the cheapness of the fee.

Dr. Kirk stated that frequently he had been asked what universities are doing to advise students concerning the professional situation which exists in the various industries. He felt that such vocational counseling should be done by the chemical societies, and not be restricted to the point of view of the individual professor, who should be devoting his time to the teaching of fundamentals.

Mr. K. B. Fleer, of the Secretary's office of the American Chemical Society, and secretary of that Society's National Committee on Professional and Economic Status, expressed his interest in the papers read and in the discussion. He asked that his remarks not be construed as official. Personally, he is not in uncompromising opposition to licensing. He felt that chemists should work for something more than legal recognition, however, for chemists cannot live on official recognition alone. He did not think that licensing laws alone, without personality development, would materially improve economic position. He also felt that employment depended on so many factors that employers would not hire only licensed chemists. Ultimately,

where a chemist gets in his profession depends largely on personal development. Recognition in the profession depends upon his continuing development. He must have a good technical background or he will be classed as incompetent, but he must have the ability to continue to develop personally after he leaves school. With this background and personal development, "who he knows" becomes an important factor in advancement. Licensing will not do for the chemical profession as a whole all that we are trying to accomplish.

Dr. Kirk immediately reminded the audience that no one has ever expected licensing to accomplish everything. It is merely one step forward. Mr. Weiss stated that he personally knew at least two concerns that encouraged their engineers to obtain licenses, and which will not employ a new engineer unless he is licensed. When an engineer is not licensed, the company has a much greater liability than if he is licensed.

Dr. Snell noted that the American Chemical Society has sponsored a system whereby schools are accredited or not accredited. The employer of chemists gives greater weight to an applicant's qualifications, if he comes from an accredited institution. Licensing will probably not be one of the reasons why a man is hired or not hired but it will be one of those things on the scale helping the employer to make up his mind. Licensing is only one of the things affecting a man's possible employment. It is not necessarily the deciding factor.

Mr. Fleer stated that those present would be interested to know that the Council of The American Chemical Society in Atlantic City charged the committee to determine from the members their preferences in licensing and other matters, and listed the following possible choices: 1. Licensing, 2. Certification, 3. A higher or "professional" grade of membership within the A.C.S., 4. Nothing.

Dr. Egloff emphasized that nowhere in THE AMERICAN INSTITUTE OF CHEMISTS' statements was licensing ever purported to be a cure-all for chemists' ills. Nor does a marriage license guarantee a happy marriage! It is a matter of fact that licensing has increased the economic status of engineers. We feel that the registration of chemists is only one step, but it is the best single step in the direction of improving the professional status of chemists. We feel that registration is but one step in the direction toward enabling the chemist to be an even better citizen. We are interested in making the chemist more civic minded. We have bills in Congress which need consideration by chemists and scientifically trained people.

Mr. M. B. Smith raised the question of a chemist who might presume on his license to work in a chemical

field for which he was not qualified. For example, what would happen if a chemist who had been working in the textile field for twenty years should take a position in the field of vitamins? Dr. Luaces answered that a registered chemist may work in any field if his ethical concept of propriety will permit him to do so. Many chemists are able to work in more than one field and outstandingly so. A number of well-known men who have notable records in various fields were mentioned.

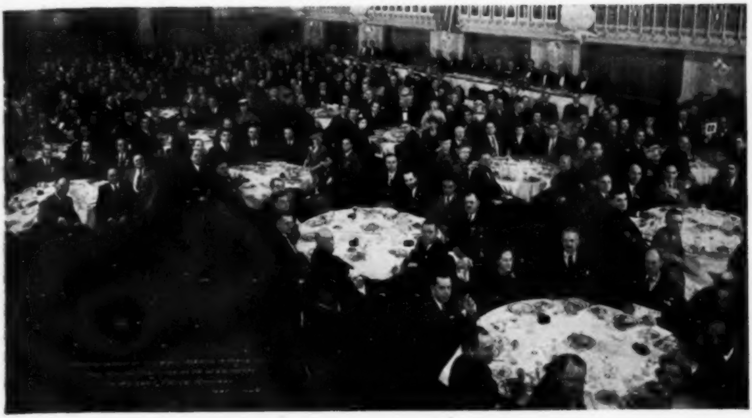
Mr. Weiss added that in the case of licensed professional engineers in New York, any engineer could take a job, if he wanted to, to build the Brooklyn Bridge, but that we have not yet had one case where a man stepped out of his field. When such a thing does occur, and a man presumes to take a job for which he is not qualified, then the ethics committee will ask for his license. A man stays where he is qualified, if only for his own reputation. If chemists are licensed, reports of incompetence would be sure to come in, more so than if they were not licensed. Dr. Snell contributed examples of competent men who have worked in widely diverse fields. Too many men cease to grow and merely become technicians in one narrow field.

Dr. Samuel M. Gordon reminded those present that employers would not look for licensed chemists until chemists are actually licensed. Is licensing worthwhile? Many chemists believe it is. So far chemists have not yet been licensed in any state. Engineers have been licensed and have benefited, and secondarily the public has been benefited. There should be no difficulty in licensing chemists. There are certain fundamental branches of chemistry. A man well-trained in the fundamentals should be a good man in a new development of the science. Licensing should be carried out on the fundamental stage of chemistry.

Dr. Snell felt that licensing is a matter of logic. We talk about whether we wish or do not wish to have licensing. We parade reasons . . . Let's try it. What do we have to lose?

Annual Business Meeting

The discussion, which gave promise of being continued indefinitely, was terminated by the necessity of calling the Annual Business meeting. Dr. Gustav Egloff, president, presided. The reports of the president, the secretary, the treasurer, the auditor, the executive director, and the editor, were presented and accepted. The annual reports of the Chapters of the INSTITUTE were accepted. The annual reports of the following committees were accepted; Constitutional Revision, Contracts, Economic Welfare, Employer-Employee Relations, Ethics, Federal Civil Service Classification and Promotion, Financial Advisory, Licensing, Membership, National Legislation Affecting Chem-



Annual Dinner A.I.C.

ists, Pan-American Relations, Qualifications and Employment.

A vote of thanks to the officers, councilors, committees, chapter chairmen, the staff of the INSTITUTE, and to all those members who gave time and effort to carrying on the work of the INSTITUTE during the fiscal year, was adopted.

The following resolution was passed: Resolved, that the members of THE AMERICAN INSTITUTE OF CHEMISTS at this annual meeting assembled, to hereby accept, ratify, confirm, and affirm, all of the acts of the Board of Directors and the National Council on behalf of THE AMERICAN INSTITUTE OF CHEMISTS during the fiscal year ending April 30, 1946.

The amendments to the Constitution, which had been mailed to the voting membership, prior to the Annual Meeting, were adopted. A ratification ballot will be sent to the membership in accordance with the Constitutional requirement for amendments.

Dr. W. T. Read reported for the National Roster of Scientific and Specialized Personnel, which is now in the U. S. Department of Labor. The National Roster is preparing a series of vocational guidance bulletins, and it has over 150 different publications to its credit. Indications are that the National Roster will be brought under the National Science Foundation.

The results of the election of officers and councilors were announced.

Dr. F. C. Huber introduced the subject of the Acheson report on international control of atomic energy. He urged that the scientific societies consider the preparation of a bill,

satisfactory to scientists, for presentation to Congress.

Upon motion, the Committee on National Legislation was requested to examine this report and to make recommendations on it to the National Council, which in turn was asked to ascertain the wishes of the membership regarding the recommendations.

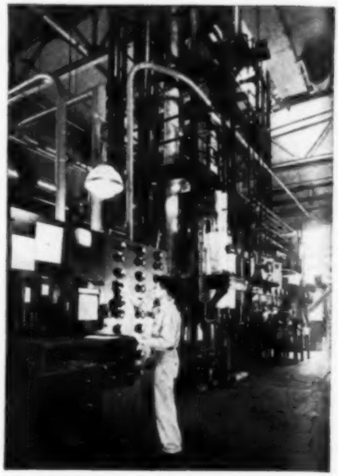
The business meeting was then adjourned.

Dinner and Medal Award

A reception and cocktail party to the medalist, Mr. Robert Price Russell, was held in the Fountain Room preceding the dinner and medal award. Soft music provided an appropriate setting for the reunion of friends and the welcome of guests.

Speakers at the dinner were Dr. Gustav Egloff, toastmaster, Maj. Gen. Alden H. Waitt, "Russell in the War Effort"; Dr. Warren K. Lewis, "Russell As I Know Him". The gold medal of the Institute was then presented to Mr. Robert Price Russell, president, Standard Oil Development Company, whose acceptance address was "Industrial Research and National Security". (These papers are printed in full in this issue of THE CHEMIST.)

The following day, through the courtesy of the Standard Oil Development Company, an inspection trip through the research laboratories of the Company at Linden, N. J. was made available. About one-hundred and fifty INSTITUTE members left the Hotel Biltmore in chartered buses at nine o'clock on an excellently scheduled tour which included the rubber laboratory, the process division laboratories, the full-scale aviation laboratory, the chemical division laboratories, the research division motor laboratories, and the research division chemical and pilot plant. In these laboratories during 1944, 1500 people were employed and some nine million dollars were expended on research and development. Much of this work was devoted to improving the quality and quantity yield of 100 octane aviation gasoline. Here, too, improvements were made in the manufacture of synthetic rubber and the development of synthetic toluene from petroleum. Butyl, Standard's



Courtesy Standard Oil (N. J.)

Process Division Interior

own synthetic rubber, was invented here. Other special developments in the Esso Laboratories were the M-69 incendiary bomb, the Mark I flame thrower, jellied gasoline, and a large-area smoke generator. The laboratories operate the only full-scale aviation engine test unit in the petroleum industry, and are working on fuels for gas turbines, jet propulsion, and guided missiles.

Certificate of Appreciation

Dr. Gustav Egloff, F.A.I.C., has received from the War Department a "certificate of Appreciation" for his services on the Consultants Petroleum Committee in supplying information to the War Department on methods of refining and treating crude oil, gasoline and natural gas.

Dr. Ralph T. K. Cornwell, director of research of the Sylvania Industrial Corporation, Fredericksburg, Virginia, spoke at the annual meeting of the New York Section of the American Association of Textile Chemists and Colorists on May third, on the subject of cellulose ethers.

Dr. Elton S. Cook, F.A.I.C., dean of research of the Institutum Divi Thomae, Cincinnati, Ohio, gave the principal address at the dedication of an affiliated research unit at the College of Saint Mary of the Springs, Columbus, Ohio, on May ninth. His subject was, "Research in the Liberal Arts College."

Webster Retires

Mr. G. E. Webster, F.A.I.C., chief of the analytical laboratory at Picatinny Arsenal, Dover, N. J., retired on April first after thirty-seven years of service with the Ordnance Department and Bureau of Mines. During World War I, he held a commission in the Ordnance Department, and in 1945 he was given the Meritorious Civilian Service Award. A dinner in honor of Mr. Webster was held, March 28th by his associates of the technical division of the Arsenal. He is succeeded in his position by Mr. T. D. Dudderar, M.A.I.C.

Ansbacher with Schenley

Dr. S. Ansbacher, formerly scientific director of the International Vitamin Corporation, and scientific consultant of The American Home Products Corporation, has been appointed director of nutritional research of the Schenley Research Division, 26 E. 6th Street, Cincinnati 2, Ohio.

satisfactory to scientists, for presentation to Congress.

Upon motion, the Committee on National Legislation was requested to examine this report and to make recommendations on it to the National Council, which in turn was asked to ascertain the wishes of the membership regarding the recommendations.

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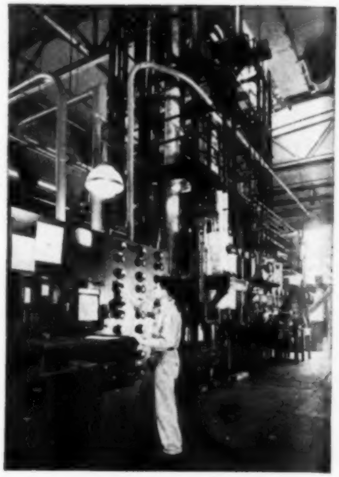

Courtesy Standard Oil (N. J.)

Process Division Interior

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Certificate of Appreciation

Dr. Gustav Egloff, F.A.I.C., has received from the War Department a "certificate of Appreciation" for his services on the Consultants Petroleum Committee in supplying information to the War Department on methods of refining and treating crude oil, gasoline and natural gas.

Dr. Ralph T. K. Cornwell, director of research of the Sylvania Industrial Corporation, Fredericksburg, Virginia, spoke at the annual meeting of the New York Section of the American Association of Textile Chemists and Colorists on May third, on the subject of cellulose ethers.

Dr. Elton S. Cook, F.A.I.C., dean of research of the Institutum Divi Thomae, Cincinnati, Ohio, gave the principal address at the dedication of an affiliated research unit at the College of Saint Mary of the Springs, Columbus, Ohio, on May ninth. His subject was, "Research in the Liberal Arts College."

Webster Retires

Mr. G. E. Webster, F.A.I.C., chief of the analytical laboratory at Picatinny Arsenal, Dover, N. J., retired on April first after thirty-seven years of service with the Ordnance Department and Bureau of Mines. During World War I, he held a commission in the Ordnance Department, and in 1945 he was given the Meritorious Civilian Service Award. A dinner in honor of Mr. Webster was held, March 28th by his associates of the technical division of the Arsenal. He is succeeded in his position by Mr. T. D. Dudderar, M.A.I.C.

Ansbacher with Schenley

Dr. S. Ansbacher, formerly scientific director of the International Vitamin Corporation, and scientific consultant of The American Home Products Corporation, has been appointed director of nutritional research of the Schenley Research Division, 26 E. 6th Street, Cincinnati 2, Ohio.

Maximilian Toch

July 17, 1864—May 28, 1946

In the passing of Dr. Maximilian Toch, science has lost an outstanding and versatile figure, and many fellow chemists have lost a kindly, able, and most helpful friend. His sound judgment and experience were always at the service of the many organizations in which he was interested. An epitome of this active career indicates his wide interests.

In 1882 he took special courses at New York University in chemistry and law, securing the LL.B. in 1886. He took special post graduate courses at Columbia University (1896), and in chemical engineering at Cooper Union. Peking University (China) awarded him the D.Sc. in 1924. He lectured on organic chemistry at Columbia, 1905-06; on paint at the City College of New York, 1909. He served as adjunct professor of industrial chemistry at Cooper Union, 1919-24; as honorary professor of chemical engineering and industrial chemistry, University of Peking, 1924; as professor of artistic painting, National Academy of Design (New York) 1924-36.

He was a fellow of the American Association for the Advancement of Science, of the New York Microscopical Society, of the Royal Photographic Society, of the Chemical Society (London), and of THE AMERICAN INSTITUTE OF CHEMISTS, which he served as president for 1936-38, besides being a powerful member of its Council for many years as well as honorary member. He was a member of The American Chemical Society, the Society of Chemical Industry (London), the American Institute of Chemical Engineers, The Chemists' Club (New York) and was its president in 1907, and also honorary member and life member. He was a member of the Society of American Magicians, Camera Club (New York), and Cosmos Club (Washington), besides being president and chief chemist of Toch Brothers, and chairman of the board of Standard Varnish Works, makers of paints, varnishes, enamels, and chemicals.

In World War I, he was in charge of camouflage and originated the Toch system of camouflage and had charge of our East coast defenses. He developed the original formula for "battleship gray" used by the U. S. Navy; also the cement-filler treatment used in the Panama Canal. For this and his camouflage work he was made a member of the American Society of Military Engineers and the Army Ordnance Association.

Apart from numerous journal and other articles he published the following books: *Materials for Permanent Painting* (1911); *How to Paint Permanent Pictures; Chemistry and Technology of Paints,* (3rd ed. 1925); *Protection and Decoration of Concrete* (1930); *Paint,*

Painting and Restoration (2nd ed. 1945). As a result of scientific examination of pigments and X-ray and infra-red ray tests, he concluded that over 80 per cent of some 400 Rembrandts were not done by the master himself, even though the work was excellent.

He was the first chemist I ever saw. About 1889, I was playing with a much younger brother of his, who pointed to him as he walked up the steps of his home and said: "That's my brother Max. He's a chemist." Later on, when I came to know him, I realized that he was much more than a chemist, for he was expert in many fields, . . . an expert lapidary and a crack pistol shot. Many prize his splendid photographs, and I have an outstanding one he took of Ellwood Hendrick, and one of Sir Edwin Landseer's lions taken in a London fog. When Leo H. Baekeland invented "Velox", the successful printing-out paper, Toch made ever so many tests for the inventor; and he was always ready to advise and help his fellow chemists. As I recall, he spoke of the great picture of Munkacsy, the Hungarian painter, representing Milton dictating *Paradise Lost* to his daughters, saying that unfortunately it would not last, as it had been painted on a background prepared with asphaltum, a material unstable to light. Toch was often called in as expert, especially in matters involving painting and paintings.

His loss will be felt keenly by all who knew him. How much greater it must be to his intimates and family, to whom we extend heartfelt sympathy. Fortunately, he showed no sign of ageing, and was intense and active to the end. The following was written in 1944, when he reach his 80th year:

Time flits by on silent wing—
Changes strike both churl and king;
But some souls defy the years,
Gathering richness that endears.
Bowed by troubles, light or weighty,
Some men seem quite old at eighty.
They should foil life's mean attacks
Like our philosophic Max.
For Max Toch has found, in sooth,
The fountain of perpetual youth;
And to those who know him nearly,
At *quatre vingt* he's *vingt quatre*
merely.

—JEROME ALEXANDER, F.A.I.C.

Arthur W. Burwell

Arthur W. Burwell, vice president and technical director of the Alox Corporation, Niagara Falls, New York, died May 24th, at the age of seventy-eight. He was born in Rock Island, Illinois, studied in Cleveland, and then went to the Kaiser Wilhelm University, Strassburg, for the Ph.D. degree in 1892. During his final year there, he was honored by Professor Fittig by being placed in charge of his laboratory.

Upon his return to America, he

started work on general petroleum refinery problems with the Standard Oil Company at Cleveland. His active career included work on petroleum, petroleum pitch, electrode manufacture, electrolytic oxidation of organic compounds, mineral separations, etc. He was a registered pharmacist at the age of twenty; he also taught chemistry and at one time served as consulting chemist for a nitro-glycerine factory. During an extended "vacation" in Montana, he homesteaded some land and had many interesting experiences.

Dr. Burwell pioneered in the oxidation of petroleum, on which he wrote numerous articles and received many patents. The Schoellkopf medal was awarded to him in 1941 by the Western New York Section of The American Chemical Society in recognition of his fundamental work on the oxidation of petroleum; his development of commercial processes for producing material useful as lubricants and rust preventives; his studies in the theory of lubrication, and his successful career of fifty years as a chemist.

Dr. Burwell became a Fellow of THE AMERICAN INSTITUTE OF CHEMISTS in 1930. He was active in the Niagara Chapter of the INSTITUTE and served as its Chapter Representative to the National Council for several years. In his passing, chemists lost a true friend.

Burrell and Neidig Form Chemical Consulting Firm

Harry Burrell, F.A.I.C., and C. P. Neidig, M.A.I.C., announce the formation of Burrell and Neidig, industrial chemical consulting firm, with offices at 115 Broadway, New York, N. Y. Mr. Burrell was formerly director of research of the Heyden Chemical Corporation, Garfield, N. J., laboratories, and Mr. Neidig was in charge of the market research and technical service group for the Heyden Chemical Corporation. The new firm consults on formaldehyde and its uses, plastics and raw materials, protective coatings, sales development work on new products, research administration and market surveys.

Hiler with Stepan Chemical

Malvern J. Hiler, F.A.I.C., is now director of research and chemical development of Stepan Chemical Company, Chicago, Illinois, manufacturers of sulphonated oils and chemical specialities. He was formerly district manager of the Chicago office of Sharples Chemicals, Inc.

Professor John H. Yoe, F.A.I.C., School of Chemistry, University of Virginia, and Mr. Walter J. Murphy, F.A.I.C., Editor, *Chemical and Engineering News,* will witness the bomb tests at Bikini Atoll, this summer.

COUNCIL

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Northern Ohio M. J. Bahnsen	*Western Pennsylvania* W. H. Hill	*New Jersey* G. L. Royer

May Meeting

The 228th Meeting of the National Council was held on Friday, May 17, 1946 at 11:00 a.m. in the Empire Lounge of the Hotel Biltmore, New York, N. Y. with Dr. Gustav Egloff, President, presiding.

The following Officers and Councilors were present: Messrs: S. R. Brinkley, M. deSimo, G. Egloff, H. L. Fisher, F. Hessel, D. B. Keyes, R. E. Kirk, E. L. Luaces, J. M. McIlvain, R. J. Moore, H. S. Neiman, E. H. Northey, D. Price, H. E. Riley, W. D. Turner, and L. Van Doren.

The minutes of the previous meetings were accepted as mailed out to the Councilors.

The Secretary reported that total

elections during the year were 205, that deceased, resignations, and dropped totaled 152, leaving a net increase in membership of 53. The total membership now stands at 2,042, a higher total than at any previous time.

The Treasurer presented the Auditor's report on the Institute's financial condition for the year, and this report was accepted.

A letter from Dr. W. H. Hill, chairman of the Committee for the Study of Qualifications for Institute Membership, was read. Upon motion, the suggestions in the letter were passed on to the incoming Officers for their attention.

A report from Dr. E. H. Northey, chairman of the Committee on Employer-Employee Relationships, covering conditions of termination of employment was presented. Upon motion made, seconded, and carried, this report was accepted with the request that it be referred to the Special Advisory Committee on THE CHEMIST for publication.

A telegram from Julius J. Pearlman, chairman of the Government Action Against Cancer Committee. 80 Franklin St., New York, N. Y.. was read, requesting that the Institute endorse the Nealy Bill (HR 4502) and the Pepper Bill (S 1875) which ask for an appropriation to be applied toward the elimination of cancer. After discussion and upon motion made, seconded, and carried, the Council went on record as in favor of these bills.

Dr. Raymond E. Kirk reported as chairman of the Special Advisory Committee on THE CHEMIST.

Upon motion made, seconded and carried, the following new members were elected:

Fellows

Batscha, Joseph Alexander,
Chief Analyst, Oakite Products, 22 Thames Street, New York, New York.

Bond, Ridgely B., Jr.,
Plant Chemist, American Sugar Refining Co., Key Highway East, Baltimore, Maryland.

Dietz, Victor H.,
Research, 3912 Wilmington Ave., St. Louis, Mo.

Dudley, James Robert,
Research Chemist, American Cyanamid Company, Stamford, Conn.

Herman, Stanford L.,
Vice President in Charge of Production, Apex Chemical Company, Inc., 200 So. 1st St., Elizabeth, New Jersey.

Gallo, S. George,
Research Chemist, Standard Oil Development Company, Elizabeth, New Jersey.

Holland, Madeline O.,
Librarian and Instructor, Philadelphia College of Pharmacy and Science; Managing Editor, Romaine Pierson Publication, 67 Wall Street, New York 5, N. Y.; Associate Editor, Business Publishers, Inc., 330 W. 42nd St., New York, New York.

Johnston, Harry A.,
Manager, Oil Processing and Refining Division, Armstrong Paint & Varnish Works, 1340 S. Kilbourn Ave., Chicago, Illinois.

Leibiger, Otto W.,
Research, University of Dayton, Dayton, Ohio.

Pearson, Herbert P.,
Technical Director, Kotal Company, 52 Vanderbilt Avenue, New York 17, N. Y.

Perrone, Joseph M.,
Director of Research, Watson-Standard Company, 230 Galvaston Street, Pittsburgh, Penna.

Rauch, L. A.,
Technical Director, Schaar and Company, 754 W. Lexington St., Chicago 7, Ill.

Schwartz, Herbert F.,
Research Chemist, Sherwin-Williams Company, 115th St. and Cottage Grove Ave., Chicago 28, Ill.

Steele, Harold K.,
Research Chemist, Standard Brands, Inc., 810 Grand Concourse, New York 51, N. Y.

Thayer, Chester D.,
Chemist, Socony Vacuum Oil Co., Inc., 412 Greenpoint Avenue, Brooklyn 22, N. Y.

Vanderbilt, Byron Michael,
Chemist, Standard Oil Development Company, Box 243, Elizabeth, N. J.

Van Delden, William H.,
Research Chemist, Montclair Research Corp., 4 Cherry St., Montclair, N. J.

Warnecke, Henning L.,
Chief Chemist, Hastings & Co., 708 Van Duzer St., Stapleton, Staten Island, N. Y.

Members

Dennery, Theodore,
Chief Chemist, Charles Dennery, Inc., 524 Magazine Street, New Orleans, La.

Kopf, M. George,
Owner, *Consulting Chemist,* Technical Specialties Company, 63 Virginia Ave., Dayton 10, Ohio.

Sheie, Robert Stanley,
Chemist, Socony-Vacuum Oil Co., 412 Greenpoint Avenue, Brooklyn 22, N. Y.

Williamson, Tunis S.,
Research Chemist, Oakite Products, 22 Thames Street, New York, N. Y.

Associate

Bachstetter, Leo S.,
Plant Chief Chemist, Kirkman Division of Colgate-Palmolive-Peet Co., 215 Water Street, Brooklyn 1, N. Y.

Raised To Fellow

Crosson, Leo H.,
Chief, Technical Section of CPM Br., MIS U. S. Army, Room 2B673, Pentagon Bldg., Washington 25, D. C.

At the conclusion of the meeting, the Councilors presented a gift to the retiring President, Dr. Gustav Egloff, as a token of their appreciation of his devoted service and outstanding achievements during his two terms as president.

For Your Library

CARBOHYDRATE METABOLISM. S. Soskin and R. Levine. *University of Chicago Press.* 315 pp. 9½" x 6½". $6.00.

This book covers the biochemistry, physiology, and energetics of carbohydrate metabolism; the biochemistry of diabetes; the role and mode of action of the endocrine glands; and the interrelation between foods. About one-fifth of the book deals with clinical aspects.

In regard to the important energy interchange in carbohydrate metabolism, the authors state that it is by no means as complicated as the details might indicate, and they compare it to the principle of mining and use of coal. A diagram is shown having the following essential features: the investment of some quantity of energy to produce large amounts of an energy substance (coal in the shaft, or glucose in the body); the raising of the energy substance to a higher energy level (the coal pile on the surface, or glycogen in the body); the conversion of the energy substance into another form of energy (running the electric generator from a steam engine fired by coal, or phosphorylation in the body); the use of more readily available form of energy for power transfer for spe-

cial uses (electric power for transportation, etc., or the use of phosphorylative energy for muscle contraction, nerve conduction, intestinal absorption, etc.) and finally, the use of a certain amount of energy derived from the energy substance to obtain more of the energy substance (use of some of the electrical energy prepared from the coal for the purpose of mining more coal, or the phosphorylation of glucose in the body).

On complete dissimilation of 1 mol. of glucose to carbon dioxide and water, from twelve to twenty-four high energy phosphate bonds are formed. These phosphate bonds contain, therefore, 144,000 to 288,000 cal. One mol. of glucose changing to carbon dioxide and water yields 673,-000 cal. Thus the energy transfer *via* phosphate bonds represents about 21 to 42 per cent of the total. Compared to this the efficiency of muscular work is usually considered about 30 per cent.

Numerous tables and graphs summarize data collected from the literature and the text is supplemented with 1200 well chosen references. The book is an important contribution to the literature concerning carbohydrate metabolism. It should offer enjoyable and profitable reading to those interested in the many important contributions that have been made in recent years in this field.

—H. TAUBER, F.A.I.C.

Universal Publishes New Monthly Bulletin

Universal Oil Products Company, Chicago, Illinois, announces a new publication, "News of Science and Industry in the U. S. S. R." edited by J. G. Tolpin, F.A.I.C., whose chemical education and experience were obtained in Russia, Germany, and the United States. This monthly bulletin will cover news on science and industry of a general nature, and will supplement the "Survey of Foreign Petroleum Literature" which Universal has published for many years, and which includes the survey of U.S.S.R. researches on hydrocarbons and their derivatives.

THE SCIENCE AND ART OF PERFUMERY. By Edward Sagarin. McGraw-Hill Book Company, Inc. 1946. 268 pp. 5½" x 8". $3.00.

The author and his colleagues at Givaudan-Delawanna, Inc., essential oil and aromatic chemical manufacturers, have pooled research and experience, and called upon outside authorities in the field, to produce this exceptionally readable and delightful book on the historical background of perfumes and odors down to the latest developments in the industry today.

Chapters are entitled, Forty Centuries of Fragrance; Sweet Odors for Jehovah, The Perfumes that Nature Created; From the Petal to the Shelf; The Perfumer's Zoo; Sticky Stuff

and Fragrant Too; Man the Duplicator; Man the Creator; An Artist in a laboratory; The Genealogy of a Formula; A Matter of Taste; A Science in Search of a Language; A Rose by Any Other Name; Children of Aphrodite; Oils for Body and Soul; Odor is a Big Business; Living in a Perfumed World; The Perfumer Turns Bookworm. A bibliography includes references up to 1945.

Vividly written in popular language, this book has not neglected the facts which give an excellent survey of the perfume industry, its psychology, and its commercial development.

Chemists Available

Chemical Director: Ph.D., F.A.I.C. At present technical director of general testing laboratory, seeks responsible position with progressive organization. Professional background includes several years of successful college teaching, and five years of industrial experience in research development and production of thermoplastics, plastic coatings, adhesives; also in parenteral solutions and ampoules. Versed in development of testing procedures, cost calculation, process improvement, maintenance. Four languages. Proven administrative ability. Woman. Age thirty-six. Please reply to Box 63, THE CHEMIST.

Analytical and Research Chemist: M.S. University of Michigan; F.A.I.C. Age 45, married, no children. Desires laboratory and/or factory position of some responsibility. Experienced in explosives, rubber, chemicals, war gases, coated paper, steel, non-ferrous metals, cement, silicates, and cleansers. Worked on analyses, methods development, and plant research and development. Held place of group leader, foreman and chief chemist. Quickly available. Location of minor importance. Salary commensurate with training, ability and experience. Please reply to Box 61, THE CHEMIST.

Industrial Research Chemist: Ph.D. Fourteen years experience in research, research direction, sales, new products introduction, advertising, and promotion. Strong in inorganic chemicals, alkalies, physical chemistry, literature research, and technical writing. Definite industrial and economic outlook. Seeks additional consulting contracts for self and associates, or permanent salaried position in research and development field. Please reply to Box 67, THE CHEMIST.

Chemist: 37, B.S. degree. Experienced in soaps, oils, textile chemicals, and production of stearic, oleic, and vegetable fatty acids. Seeks position of responsibility in supervisory or administrative capacity. Present salary $4600. Prefers Philadelphia location. Please reply to Box 65, THE CHEMIST.

Positions Available

Experienced teacher, Ph.D., man or woman, to head the department of chemistry in a small liberal arts college for women. Middle Atlantic state. Full information, including references, training, experience, personal data, salary expected, photograph, must accompany first letter. Please reply to Box 60, THE CHEMIST.

Experienced Rayon Chemist for position in South America. Expenses paid in addition salary. Please reply to Box 62, THE CHEMIST.

Elsevier Publishing Company, Inc., and Interscience Publishers, Inc., to avoid the co-existence of two journals devoted to the field of large molecules, have coordinated their plans and are publishing, jointly, the *Journal of Polymer Science*, issued bimonthly. The subscription price is $5.50 per year.

Industrial Progress for Korea

Ki Ho Lah, executive secretary of the Technical Education Supervisory Board of the Bureau of Mining and Industry, Seoul, Korea, is among a group of prominent Koreans visiting the United States. Their trip is sponsored by the United States Military Government in Korea, to establish sources of cultural and technical aid for that country. During their stay in Washington, the visitors are guests at the Blair Lee House. The Department of State is assisting them to make contact with interested departments of the government, private educational foundations, and institutions.